FOURIER-TRANSFORM COMPLEX REFRACTIVE INDEX SPECTROSCOPY AT Hz-LEVEL WITH OPTICAL FREQUENCY COMBS

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Two relatively new spectroscopic techniques suitable for implementation in a broadband FTS are cavity mode-width spectroscopy and cavity mode dispersion spectroscopy [1,2]. They require scanning the cavity resonances to obtain information about their width and position, yielding information about molecular absorption and dispersion. Previously they used continuous wave lasers, showing signal-to-noise ratio and resolution similar to the well-established cavity ring-down spectroscopy. However in this implementation they shared the same limits of measurement range and relatively slow acquisition. Meanwhile the optical frequency comb-based cavity-enhanced FTS with sub-nominal resolution [3,4] is a perfect match for those methods, allowing for simultaneous measurement of thousands of cavity modes without the limit of cavity dispersion and the requirement of a reference measurement [5]. Here we present the measurements of 10 kHz HWHM cavity resonances, which are some of the narrowest features ever measured by the FTS, from which we derive the absorption and dispersion spectra of the 0-3 band of CO in Ar.

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